

A REVISION OF *GARDENIA* ELLIS (RUBIACEAE) FROM NORTH-EASTERN QUEENSLAND

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Summary

Seven species of *Gardenia* are endemic to north-eastern Queensland. Five new species, *G. actinocarpa*, *G. psidioides*, *G. rupicola*, *G. scabrella* and *G. tessellaris* are described and a key to all species is provided. Five taxa currently included in *Gardenia* are excluded from the genus: *G. jardinei* F. Muell. ex Benth., *G. kershawii* Bailey, *G. macgillivraei* Benth., *G. merikin* Bailey and *G. ochreatea* F. Muell.

The genus *Gardenia* Ellis has approximately 120 species distributed throughout the Old World tropics. Few Australian species occur in closed forests, the majority being found in savannah woodlands. In north-eastern Queensland three species occur in dry open woodlands, two in semideciduous vine forest, and two in complex mesophyll vine forests.

Mueller (1858) described a number of species of *Gardenia* using the generic concept (Richard 1829) which encompassed species that had large flowers with stamens included in the corolla tube, and large, many-seeded fruits with pulpy placentas. Subsequently Bentham (1867) distinguished between *Gardenia sens. strict.*, in which the ovary is unilocular, and *Randia* Houst. ex L., in which it is bilocular.

The revision of the African members of the *Gardenia*-*Randia* assemblage by Keay (1958) revealed that *Gardenia sens. strict.* was characterized by pollen in permanent tetrads. However, some *Gardenia*-like species with unilocular ovaries were found to possess monad pollen, while other bilocular species possessed pollen in tetrads. This variation, together with differences in modes of branching, and seed coat and stipule morphology, was used to split the group into many new genera.

This approach has been followed by recent workers on African and Asian *Gardenieae* (Robbrecht & Puff 1986, Tirvengadam 1983), but has yet to be applied in Australia. Of the species currently referred to *Gardenia* in north-eastern Queensland, only two remain as true members of the genus: *G. vilhelmii* (syn. *G. edulis* F. Muell.) and *G. ovularis*. The following species do not possess permanent tetrads of pollen and should be excluded: *G. jardinei* F. Muell. ex Benth., *G. kershawii* Bailey, *G. macgillivraei* Benth., *G. merikin* Bailey and *G. ochreatea* F. Muell. *Gardenia merikin* is also distinguished by its bilocular ovary and all five are distinguished from *Gardenia sens. strict.* by characters of the flower and fruit. These species will be dealt with in detail in subsequent publications.

All species have been examined in the field. Descriptions and measurements are based on living and dried material and are applicable to both. Leaf terminology follows Hickey (1973), bark terminology follows Hyland (1982) and ecological terminology follows Webb (1978). The conservation status has been coded using the ranks proposed by Leigh, Briggs and Hartley (1981). The terminology used in describing the corolla shape has been inconsistent in the literature; the terms used here are defined as follows:

cylindrical: the tube does not expand to more than twice its basal diameter and the expansion is uniform over the entire length of the tube. (The corolla shape including the lobes is hypocrateriform).

tubiform (trumpet shaped): the tube is cylindrical in the lower part and convex in the upper part, opening to more than twice the basal diameter. (Infundibular has not been used here as it implies an obconical shape).

crateriform (goblet shaped): the tube is contracted in the lower part and concave in the upper part, opening to more than twice the basal diameter.

Taxonomy

Notes on the genus in Australia

As many extra-Australian species are poorly known it is premature to propose a revised generic description. The following description includes character states which are common to the Australian species and to the type species, *G. augusta* (L.) Merr.

Thornless shrubs and small trees with sympodial branching. Leaves opposite or whorled, often unequal, sessile or petiolate; lamina entire or repand; secondary venation campodromous; tertiary venation usually strongly percurrent. Stipules connate, fused into an intrapetiolar dome or cone which entirely encloses the apical bud, and which consists of a coriaceous basal part that is continuous with the petioles, and a usually chartaceous upper part which covers the bud. Numerous colleters in the basal part, between the stipule and the stem, produce viscid resin which fills and eventually ruptures the upper part of the stipule cone just prior to the rapid expansion of the new leaves. The upper part generally persists for several nodes but then disintegrates. The basal part persists until after leaf abscission. Flowers usually bisexual, pedicellate, always terminal, solitary or rarely in cymes. Torus globular, sometimes with ridges which are continuous with the calyx lobes. Calyx cylindrical with 5–10 linear more or less coriaceous lobes which are sometimes adnate by a chartaceous sheath. Corolla tube cylindrical, tubiform or crateriform, white; corolla lobes 5–9, imbricate in bud. Stamens 5–9, anthers sessile, partially exerted or fully enclosed, inserted below sinuses of corolla lobes. Pollen grains fused into permanent tetrads; exine smooth or ornamented, pale yellow. Style clavate; stigmas 2–4(–7), adnate and not reflexed at maturity, glabrous. Ovary inferior, unilocular with parietal placentation; placentas 2–4(–7); ovules numerous and partially embedded in the placenta. Fruit a drupe, spherical to elongate-ellipsoidal; exocarp usually green to yellow when mature (red in *G. augusta*); mesocarp parenchymatous or variously structured; endocarp putaminaceous; seeds numerous, lenticular, embedded in a soft placental mass.

Four species endemic to north-eastern Queensland (*G. scabrella*, *G. psidioides*, *G. rupicola* and *G. actinocarpa*) form a natural group and do not have close affinity to any other Australian or extra Australian species known to me. The character states of the group are fruits hexagonal, flowers hexamerous turning brown with age, corolla tube cylindrical, stigmas pale green, anthers affixed subapically and fully included in the corolla tube, placental pulp cream, and tegmen fawn to light-tan. The species are spindly shrubs or suffrutescent undershrubs.

The other three species (*G. wilhelmii*, *G. ovularis* and *G. tessellaris*) are not closely related to each other. All are distinguished from the above group by the possession of fruits that are round in transverse section, flowers 5–8-merous turning yellow with age, corolla tube tubiform or crateriform, stigmas white, anthers affixed medially and partially exerted, placental pulp pink, and tegmen claret coloured. All three species are generally small trees. *Gardenia ovularis* has closer affinities to New Guinean species than to the other two.

Key to north-eastern Queensland species of *Gardenia*

1. Leaves 10–35 mm long, secondary veins at 30–40° to the midvein; corolla crateriform; fruit spherical, less than 16 mm diameter *G. wilhelmii*
 Leaves more than 35 mm long, secondary vein angles more than 40° to the midvein; corolla tube tubiform or cylindrical; fruits distinctly elongated or, if spherical, more than 25 mm diameter 2
2. Trees to 25 m; petioles 7–25 mm long; corolla tube tubiform, white turning yellow with age; stigma white; anthers partially exerted; fruit ovoid or spherical; placental pulp pink; seeds claret coloured 3
 Shrubs (rarely small trees) and undershrubs; petioles 2–7(–9) mm long; corolla tube cylindrical, white turning brown with age; stigma pale green, anthers fully included in the corolla tube; fruit an ovoid or elongate-ellipsoid drupe distinctly hexagonal in cross section; placental pulp cream; seeds pale brown 4

3. Bark tessellated; leaves obovate with 13–17 secondary veins on each side of the midvein; mesocarp 4–5 mm thick, distinctly granular. Savannah woodlands **G. tessellaris**
 Bark smooth; leaves narrowly elliptical with 8–13 secondary veins on each side of the midvein; mesocarp 2–3 mm thick. Complex mesophyll vine forests **G. ovularis**
4. Single to several-stemmed shrubs 2–4(–6) m tall; leaves lacking indumentum other than scattered scabrous hairs; secondary vein angles more than 60° to the midvein 5
 Spreading suffruticose undershrubs to 1(–2) m tall; leaves with tomentum along veins on the abaxial surface or covering the entire abaxial surface; secondary vein angles less than 60(–65)° to the midvein 6
5. Leaves with 13–16 secondary veins on each side of the midvein; stipules less than 8 mm long; calyx lobes 16–25 mm long; corolla lobes 20–30 mm long; fruit star-shaped in transverse section. Complex mesophyll vine forest, Cape Tribulation NP **G. actinocarpa**
 Leaves with 16–22 secondary veins on each side of the midvein; stipules more than 8 mm long; calyx lobes 6–12 mm long; corolla lobes 28–40 mm long; fruit hexagonal in transverse section. Semideciduous mesophyll vine forests and deciduous vine thickets **G. scabrella**
6. Leaves (35–)70–132 mm long, abaxial surface with tomentum on veins; 14–21 secondary veins on each side of the midvein; tertiary venation not prominently raised; stipules (7–)12–25 mm long. Deciduous vine thickets and adjacent woodlands of Hann Ck area, south of Temple Bay **G. psidioides**
 Leaves 35–70(–80) mm long, abaxial surface densely tomentose; 11–16 secondary veins on each side of the midvein; tertiary venation prominently raised; stipules 5–10 mm long. Savannah woodland of Laura sandstone area **G. rupicola**

Gardenia actinocarpa Puttock, *sp. nov.* Species distinctissima *G. scabellae* affinis sed fructu acutangulo, margine laminae subrepando, nervis lateralibus paucioribus, lobis calycis longioribus atque bilateraliter compressis, lobis corollae brevioribus differt et a *G. ovulare* foliis scabris, tubo corollae cylindrico, stigmatе chlorotico, antheris inclusis facile distinguenda. **Typus:** COOK DISTRICT: Oliver Creek, Cape Tribulation, October 1973, *Webb* 10826 & *Tracey* (holo: BRI; iso: K, NSW, QRS).

Spindly arborescent evergreen shrub to 5 m tall; trunk at breast height to 3 cm diameter. Bark to 3 mm thick; periderm smooth, silver grey and mottled grey and olive, without conchoidal decortifications; lenticels scattered tangentially-elongated or round protrusions; subrhynchidome vivid light green; outer bark not layered, blaze cream; inner bark blaze white. Wood hard and close grained, not brittle, cream. Leaves opposite, chartaceous, glossy mid to yellowish green above, dull pale green below, with sparse scabrous hairs on veins and margins; petioles 4–9 mm long; lamina oblanceolate to narrowly elliptical, 10–27 cm long, 3.5–7 cm wide with repand margins, attenuate apex and acute to cuneate base; secondary veins 13–16 pairs, 60–80° to the midvein, raised slightly above and strongly below; tertiary venation strongly percurrent, translucent; dense tufts of short hyaline hairs in secondary midvein angles. Stipules conical, 3–7 mm long, inflated, scabrous; colleters lanceolate, 0.4–0.8 mm long, 0.1 mm wide, pale yellow. Flowers 6-merous, solitary, terminal; pedicels 5–15 mm long, scabrous. Torus 5–10 mm long, pale green, with ridges continuous with the calyx lobes. Calyx cylindrical, coriaceous; tube 3–9 mm long; lobes linear, 16–25 mm long, bilaterally compressed. Corolla pale green in bud, white at anthesis, turning brown with age; tube cylindrical, 15–25 mm long, 2–3 mm diameter at the base increasing to 3–5 mm diameter in the upper part, glabrous inside and out; lobes elliptical, 20–30 mm long, 10–12 mm wide, glabrous. Anthers 10–14 mm long, attached 2–3 mm from their apices, inserted 2–4 mm below the sinuses of corolla lobes, fully included within the corolla tube. Style 20–30 mm long, as long as the corolla tube, stigmatic lobes 3, 10–12 mm long. Ovary with 3 parietal placentas. Fruit broadly ellipsoidal, 28–46 mm long, 22–32 mm diameter, smooth, with 6 acute

longitudinal ridges, crowned by the calyx remnants; epicarp pale green whilst developing, yellow green when mature; mesocarp 3–6 mm thick, parenchymatous, spongy and white; endocarp brittle, 0.5 mm thick; mature placenta pasty, cream coloured. Seeds 3.2–4.5 mm diameter, 1.4–1.6 mm thick; hilum occupying one-third of the perimeter; tegmen light tan. Fig. 1A–I.

Specimens examined: Queensland, COOK DISTRICT: Oliver Ck, 16°06'S, 145°27'E, Oct 1973, *Webb* 10826 & *Tracey* (holo: BRI; iso: K,NSW,QRS); Oliver Ck, VCL Noah, 16°07'S, 145°26'E, Feb 1982, *Gray* 2430 (QRS,UNSW); Oliver Ck, VCL Noah, 16°08'S, 145°22'E, Jun 1978, *Sanderson* 1538 (QRS); between Oliver Ck and Noahs Beach, 2.3 km E of Noah Ck crossing Cape Tribulation rd, 16°08'S 145°26'E, Dec 1983, *Puttock* UNSW15950 (BR,BRI,CANB,QRS,UNSW); ditto, UNSW15951 (BRI,K,L,MEL,UNSW); ditto, UNSW15954 (UNSW); ditto, Jul 1984, *Puttock* UNSW16727 & *King* (UNSW).

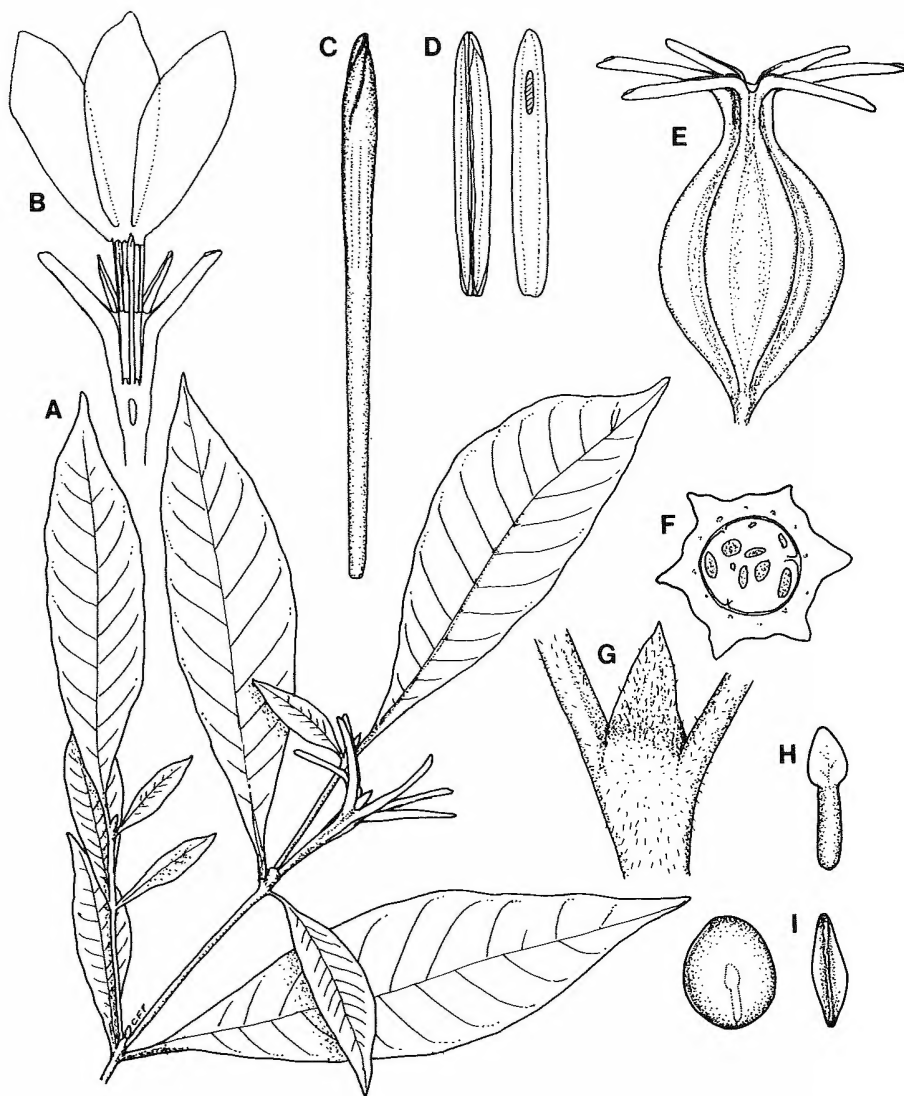


Fig. 1. *Gardenia actinocarpa*: A. branchlet bearing flower bud $\times 0.67$. B. half flower $\times 1$. C. style $\times 3$. D. anther, 2 views $\times 3$. E. mature fruit $\times 1$. F. T.S. of mature fruit $\times 1$. G. stipule crowning branch tip $\times 5$. H. embryo $\times 10$. I. seed, 2 views $\times 3$. A–D Gray 2430; E–I Puttock UNSW 15950.

Distribution: The species is endemic in eastern Cape York Peninsula, being only known from the type locality (16°06–08'S, 145°22–26'E), a particularly vulnerable tract of rainforest on the north side of Noah Ck, east of Oliver Ck to Noah Beach, near Cape Tribulation. **Map 1A.**

Habitat: This species grows in coastal complex mesophyll vine forests on quaternary alluvium derived from acidic and basic rocks. The annual rainfall is more than 3000 mm.

Phenology: This species flowers in January and February, and is not strongly perfumed; fruits mature between August and October.

Affinities: *Gardenia actinocarpa* is a very distinctive species that has affinities with *G. scabrella*, but differs in its acutely ridged fruits, opposite leaves with fewer secondary veins and slightly repand margins, and flowers with longer, bilaterally compressed calyx lobes and shorter corolla lobes. It occurs in complex mesophyll vine forests, whereas *G. scabrella* occurs in semideciduous vine forests and deciduous vine thickets.

Conservation status: This rare and possibly endangered species is currently known from only some twenty plants within 50 metres of the Daintree to Cape Tribulation road (Conservation status 2E). The locality, in the Noah section of Cape Tribulation National Park, is known for its local endemism (J.G. Tracey, pers. comm.).

Vernacular name: not known.

Etymology: The specific epithet is derived from *actinos* (ray) and *carpos* (fruit), referring to the star-shaped fruit.

***Gardenia ovularis* Bailey**, Queensland Dept Agric. Bull. No. 21, Bot. Bull. No. 7: 64 (1893), Queensland woods. Centennial international exhibition 2nd ed. 88 (1899), Queensl. fl. 3: 757 & fig. opposite (1900), Compr. cat. Queensland pl. 241 (1913); C.T. White, Contr. Arnold Arbor. 4: 98 (1933); B.P.M. Hyland, A revised card key to rainforest trees of north Queensl. 2nd ed. 49 (1982). **Typus:** COOK DISTRICT: Johnstone River, without date, *Bancroft* s.n., (lecto (here designated): AQ317839!; iso: Centennial International Exhibition wood collection number 242A, and BRI!, K!, MEL!).

G. macgillivraei Benth. var. [–], F.M. Bailey, Queensland woods. Colonial and Indian exhibition 52 (1886), Queensland woods. Centennial international exhibition 77 (1888).

Evergreen (or ?facultatively deciduous) columnar tree to 25 m tall; trunk at breast height to 35 cm diameter. Bark to 20 mm thick; periderm smooth, minutely tessellated or scaly, mottled silver grey; older stems without conchoidal decortications; lenticels scattered irregular to circular protrusions; subrhynchium vivid light green; outer bark layered, granular with fawn to cream blaze; inner bark blaze cream. Wood hard and close grained, not brittle, cream. Leaves opposite; chartaceous, glossy mid to yellowish green above, glossy pale green below; petioles 8–15 mm long, minutely hairy or glabrous; lamina elliptical, glabrous, 8–24 cm long, 3–8 cm wide with acuminate apex and attenuate base; secondary veins 8–15 pairs, 55–65° to the midvein, raised slightly above and strongly below, brown when dry; tertiary venation weakly percurrent, opaque; shallow depressions in secondary/midvein angles with dense tufts of short hyaline hairs. Stipules conical, 6–10 mm long, inflated, minutely hairy; colleters lanceolate, 0.5–0.9 mm long, 0.1 mm wide. Flowers 5–7-merous, solitary (?rarely in 3-flowered cymes), terminal. Pedicels 5–10 mm long, minutely hairy. Torus 4–5 mm long, without ridges, pale green, minutely hairy. Calyx coriaceous; tube cylindrical, 4–5 mm long; lobes linear, 5–15 mm long, spreading. Corolla pale green in bud, white at anthesis, turning yellow with age; tube tubiform, 15–32 mm long, 2–4 mm diameter at the base increasing to 7–10 mm diameter in the upper part, sparsely pubescent outside, glabrous inside; lobes elliptical, 12–26 mm long, 5–8 mm wide, glabrous. Anthers 10–18 mm long, attached 4–8 mm from their apices, inserted 2–3 mm below sinuses of corolla lobes, the apices exceeding the corolla tube by 4–5 mm. Style 20–35 mm long, exceeding the tube by several millimetres; stigmatic lobes 2–4, 4–8 mm long. Ovary with 2–4 parietal placentas. Fruit ovoid, 30–40 mm long, 20–38 mm diameter, smooth with 8 or 9 minute longitudinal ridges and sometimes crowned by the calyx remnants; pedicel 10–15 mm long; epicarp pale green

whilst developing, yellow when mature; mesocarp granular, 2–3 mm thick; endocarp brittle, 1–2 mm thick; placental mass pasty, pink. Seeds 1.6–2.5 mm diameter, 0.5–0.8 mm thick; hilum occupying one-third to one-half of the perimeter; tegmen claret coloured. **Fig. 2A–H.**

Selected specimens: Queensland. COOK DISTRICT: Granite Ck, lower Bloomfield R., 15°55'S, 145°21'E, Sep 1960, *Smith* 11079 (BRI); Oliver Ck, a tributary of Noah Ck, 16°06'S, 145°27'E, Aug 1972, *Webb* 10887 & *Tracey* (BRI); Daintree R., Sep 1937, *Brass* 189 & *White* (BRI); S.F. 143, Little Mossman L.A., 16°32'S, 145°22'E, Sep 1978, *Gray* 1025 (QRS); T.R. 66, Mt Lewis, 16°36'S, 145°18'E, Sep 1978, *Moriarty* 2452 (QRS); Mt Formantine, 16°46'S, 145°35'E, Sep 1959, *Smith* 10844 (BRI); Forgan Smith's Lookout track, Oct 1949, *Flecker* 13302 (NSW.QRS); Barron R., 1891, [*Cowley* 71] (BRI 22481); S.F. 607, Shoteel L.A., 16°55'S, 145°36'E, Feb 1982, *Gray* 2453 (QRS); S.F. 185, Buckley L.A., 17°08'S, 145°38'E, Apr 1978, *Risley* 388 (QRS); Danbulla, 23 Oct 1958, *Jones* 1115 (BRI,CANB); S.F. 310, E of Lake Barrine, 17°15'S 145°40'E, Apr 1971, *Stocker* 689 (BRI,QRS); S.F. 99, Herberton Ra., Oct 1964, *Schodde* 4180 (AD,BRI,CANB,L); Boonjie, Oct 1929, *Kajewski* 1259 (BRI,MEL,NSW); ditto (BRI,MEL); Johnstone R., Dec 1915, *Michael* 71 (BRI); Johnstone R., without date [1883] [*Bancroft*] s.n. (lecto: AQ317839, BRI; iso: K,MEL); Qld, Dec 1883, [*Bancroft*] s.n. (MEL); S.F. 755, Barong L.A., 17°31'S, 145°50'E, Sep 1976, *Fitzsimon* 87, (QRS); Etty Bay, Jul 1950, *Webb* 2397 (CANB); Gregory Falls, 1962, *Webb* 6634 & *Tracey* (BRI); Stewarts R. [Stewart Ck], 1981, *Handsam* s.n. (K). (45 specimens examined).

Distribution: This species is endemic to the coastal ranges from Yorkes Range (latitude 15°55'S) to Walter Hill Range (latitude 17°40'S) from sea level to 1600 metres. **Map 1B.**

Habitat: The species is locally common in simple notophyll evergreen and complex mesophyll vine forests on basaltic kraznozem, xanthozem and alluvial soils derived from acidic and basic rocks, in areas of rainfall in excess of 1600 mm.

Phenology: Flowering occurs in the dry season, between July and November (but prolifically in September and October). The flowers have a very strong sweet perfume. Fruits mature between December and March.

Affinities: The species is distantly related to *G. tessellaris* and differs in its predominantly smooth bark, elliptical leaves with fewer veins, fruits with a thinner mesocarp which does not possess an inner sclereid layer. This species occurs in vine forests, whereas *G. tessellaris* occurs in open savannah woodlands.

Conservation status: This species appears to be reasonably well preserved in several national parks, at low and high altitudes; it is also currently well represented in logging areas and timber reserves.

Vernacular name: not known.

Etymology: The specific epithet refers to the fruit as it in “size and shape resembles a pigeons egg” (Bailey 1893).

Typification: Bailey used three collections to circumscribe this species. The most substantial was gathered by Dr T.L. Bancroft from the Johnstone River, prior to 1886. This collection was commissioned by Bailey as part of the log collections made for the Colonial Exhibition of 1886 and the Centennial International Exhibition of 1888; a specimen of this collection is here chosen as the lectotype. There seems to be at least three extant specimens from this collection; one at BRI (AQ317839) annotated “242A No. in Wood Col. *Gardenia macgillivraei* var. *Johnstone River Bancroft*”, one at MEL annotated “M M second series *Gardenia new*” and, almost certainly, another at Kew lacking any collecting details. The exhibition specimens, a book-block, plank and veneer, also part of the type collection, have not been found even though Bailey stated that all the specimens in the exhibiton be “prepared in duplicate, with the view to keeping within the colony, as an adjunct to our rich herbarium, so valuable a collection of the indigenous woods” (Bailey 1886: iii).

The other two syntype collections were made by Cowley. The first was a single fruit sent to Bailey in 1890 and was the only fruit available for the protologue; this has not been found. Cowley later sent a better specimen to Bailey with the annotation “No71 the fruit only of this *Gardenia* was sent last year, you thought it new” (BRI 22481) and “No71 small tree fruit sent separate” (BRI s.n.).

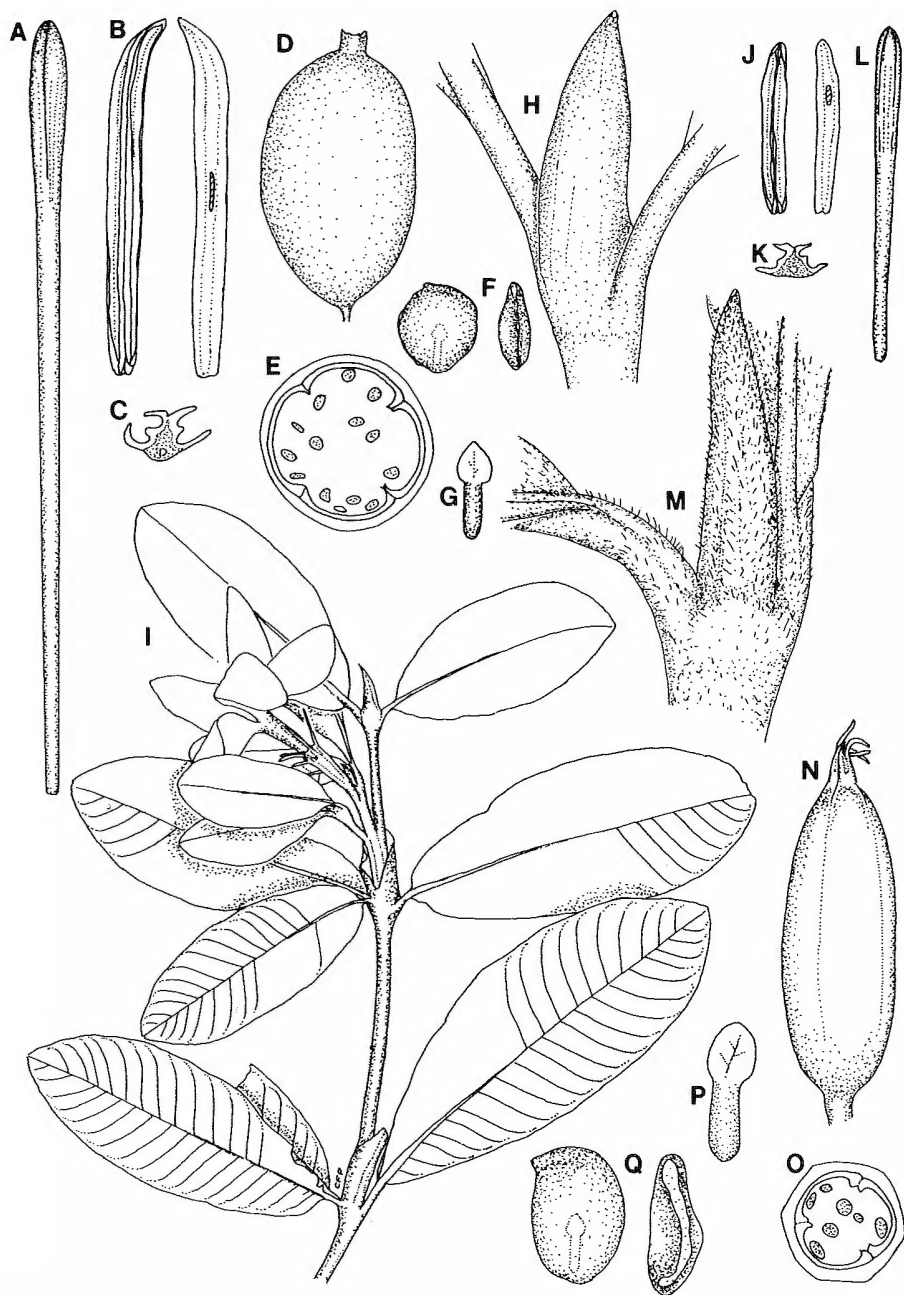


Fig 2. *Gardenia ovularis*: A. style $\times 3$. B. anther, 2 views $\times 3$. C. T.S. of anther $\times 6$. D. mature fruit $\times 1$. E. T.S. of mature fruit $\times 1$. F. seed, 2 views $\times 3$. G. embryo $\times 10$. H. stipule crowning branch tip $\times 5$. *G. psidioides*: I. flowering branchlet $\times 0.67$. J. anther, 2 views $\times 3$. K. T.S. of anther $\times 6$. L. style $\times 3$. M. stipule crowning branch tip $\times 5$. N. mature fruit $\times 1$. O. T.S. of mature fruit $\times 1$. P. embryo $\times 10$. Q. seed, 2 views $\times 3$. A–C Webb 10887 & Tracey, D–H Gray 2453, I Puttock UNSW 16945, J–L Puttock UNSW 16953, P, Q Wallace NSW 83213.

Gardenia psidioides Puttock, sp. nov. *G. rupicola* affinis sed foliis majoribus, nervis lateralibus plus numerosis, antheris longioribus et fructibus majoribus differt et a *G. ovulare* foliis subter tomentoses, tubo corollae cylindrico, stigmatibus chlorotico, antheris inclusis, fructu anguste ellipsoideo facile distinguenda. **Typus:** COOK DISTRICT: 36.4 km E of Moreton Telegraph Station, 12°27'S, 142°54'E, 21 July 1984, *Puttock* UNSW16953 & *King* (fl. & fr.) (holo: BRI; iso: K, MEL, NSW, QRS).

Spreading evergreen suffrutescent undershrub to 1 m tall; branches to 10 mm thick. Bark to 2 mm thick; periderm smooth, fawn; lenticels absent; subrhynchium vivid light green; bark blaze cream. Wood hard and close grained, not brittle, cream. Leaves opposite or ternate, chartaceous, glossy dark green above, dull pale green below, sparsely scabrous above, tomentose below; petioles 2–9 mm long; lamina narrowly elliptical to oblanceolate, 3.5–13.2 cm long, 1.6–5.2 mm wide; apex acute; base cuneate to acute; secondary veins 16–21 pairs, 50–60° to the midvein, raised slightly above and strongly below; tertiary venation strongly percurrent, translucent; tufts of long hyaline hairs in secondary/midvein angles, somewhat obscured by the tomentum of the leaf. Stipules conical, (7–)12–25 mm long, inflated, rusty coloured, tomentose; colleters columnar, 0.4–0.7 mm long, 0.1 mm wide, sessile, light brown, accompanied by few hyaline hairs. Flowers 6-merous, solitary, terminal; pedicels 6–12 mm long, sparsely hairy. Torus 3–5 mm long, pale green, minutely ridged. Calyx cylindrical, chartaceous; tube 3–5 mm long, lobes linear, 2–15 mm long. Corolla pale green in bud, white at anthesis, turning brown with age; tube cylindrical, 15–17 mm long, 2 mm diameter at the base increasing to 3–4 mm diameter in the upper part, sparsely hairy outside, glabrous inside; lobes elliptical, 17–30 mm long, 8–11 mm wide, glabrous. Anthers 7–8 mm long, attached 1–2 mm from their apices, inserted 3–4 mm below the sinuses of the corolla lobes, fully included within the tube. Style 15–17 mm long, as long as the corolla tube; stigmatic lobes 3, 5–7 mm long. Ovary with 3 parietal placentas. Fruit elongate-ellipsoid, 40–50 mm long, 14–20 mm diameter, smooth, hexagonal in transverse section; calyx remnants brittle and not always persistent; pedicel (7–)11–17 mm long; epicarp pale green whilst developing, yellow green to light brown when mature; mesocarp 2–4 mm thick, not fibrous and possessing few longitudinal sclereid bands; endocarp brittle, 1–2 mm thick; mature placenta pasty, cream coloured. Seeds 2.1–3.8 mm diameter, 1.1–1.4 mm thick; hilum occupying one-third to one-half of the perimeter; tegmen light tan. **Fig. 2I–Q.**

Specimens examined: Queensland. COOK DISTRICT: 36.4 km E of Moreton Telegraph Station, 12°27'S, 142°54'E, Jul 1984, *Puttock* UNSW16943 & *King* (UNSW); ditto, UNSW16944 (UNSW); ditto, UNSW16945 (UNSW); 36.4 km E of Moreton Telegraph Station, Jul 1984, *Puttock* UNSW16951 & *King* (BR, BRI, CANB, K, L, UNSW); ditto, UNSW16953 (holo: BRI; iso: K, MEL, NSW, QRS); ditto, *Puttock* UNSW16964 (AD, NSW, UNSW); 47.9 km E of Moreton Telegraph Station, 12°28'S, 142°59'E, Jul 1984, *Puttock* UNSW16957 & *King* (BRI, CANB, NSW, UNSW); 50.5 km E of Moreton Telegraph Station, 12°28'S, 143°00'E, Jul 1984, *Puttock* UNSW16954 & *King* (AD, BRI, UNSW); Hann Ck, Aug 1983, *Wallace* 8328 (NSW).

Distribution: *G. psidioides* is endemic to northern Cape York Peninsula, being known from three localities in the vicinity of Hann Creek (12°27–28'S, 142°54'S–143°00'S), altitude 40–80 m. **Map 1B.**

Habitat: *Gardenia psidioides* is locally common on the slopes of an unnamed range between Temple Bay and the Pascoe River in pockets of deciduous vine thickets and rarely in adjacent open woodland, on deep silicious sand, in an area with 1300–1600 mm rainfall per annum.

Phenology: This species flowers in July and August, and is not strongly perfumed. Its fruits mature between July and September.

Affinities: *G. psidioides* is closely related to *G. rupicola* but differs in its usually larger leaves with greater number of secondary veins and tertiary venation on the abaxial surface weakly raised, longer anthers and larger, elongated fruits. This species occurs in open woodland and deciduous vine thickets on deep sand, whereas *G. rupicola* occurs in savannah woodland amongst sandstone outcrops.

Conservation status: The track from Moreton Telegraph Station to Bromley Station and the Pascoe River crossing, currently bisects the only known patch of this species in open woodland. Although it is only known from several localities within an eight kilometre radius, it may occur in similar habitats in the botanically unexplored area behind Temple Bay (Conservation status 2K).

Vernacular name: not known.

Etymology: The specific epithet refers to the resemblance of the foliage to that of *Psidium guajava* L. (Guava).

Typification: This species exhibits two growth forms. Inside the thickets it is an open, spreading shrub to between 0.5 and 1 metre high. In the adjacent open woodlands it is prostrate (0.2–0.4 metres high) and produces adventitious roots near the nodes. When plants in the open woodland were observed to be flowering and fruiting prolifically, plants in the thickets were almost invariably only vegetative (pers. obs. July 1984). The type specimen is the open woodland form.

Gardenia rupicola Puttock, *sp. nov.* *G. psidioidi* affinis sed foliis minoribus densissime tomentosis nervis lateralibus paucioribus, antheris fructibusque minoribus differt et a *G. ovulare* foliis subter dense tomentoses, tubo corollae cylindrico, stigmatibus chlorotico, antheris inclusis, fructu anguste ellipsoideo facile distinguenda. **Typus:** Cook District: Split Rock, 13 km S of Laura, 15°39'S, 144°30'E, 15 December 1983, Puttock UNSW15926 (fl.) (holo: BRI; iso: K, NSW).

Gardenia sp. K. Williams, Native pl. Queensland 2: 142 (1984).

Spreading facultatively deciduous, suffruticose undershrub to 1.5(–2) m tall; branches to 10 mm thick. Bark to 3 mm thick; periderm smooth, silver grey; lenticels scattered irregular to round protrusions; subrhynchium vivid light green; bark blaze cream. Wood hard and close grained, not brittle, cream. Leaves opposite, chartaceous, glossy mid to yellowish green above, pale green below, sparsely hairy above, densely tomentose below; petioles 1–3 mm long; lamina narrowly elliptical to oblanceolate, 3.5–8 cm long, 1.5–4.5 cm wide; apex and base acute; secondary veins 11–16 pairs, 40–65° to the midvein, raised slightly above and strongly below; tertiary venation strongly percurrent, opaque; domatia absent. Stipules conical, 5–10 mm long, inflated, rusty coloured, shaggy hairy; colleters lanceolate, 0.4–0.6 mm long, 0.1 mm wide, light brown, mixed with a few hyaline hairs. Flowers 6-merous, solitary, terminal; pedicels 2–4 mm long, sparsely hairy. Torus 3–4 mm long, pale green, minutely ridged. Calyx cylindrical, chartaceous; tube 3–5 mm long; lobes linear, 4–6 mm long. Corolla pale green in bud, white at anthesis, turning brown with age; tube cylindrical, 13–16 mm long, 2 mm diameter at the base increasing to 3–4 mm diameter in the upper part, with scattered hairs outside, glabrous inside; lobes elliptical, 18–27 mm long, 10–12 mm wide, glabrous. Anthers 9–13 mm long, attached 3–4 mm from their bases, inserted 4–5 mm below the sinuses of the corolla lobes, fully included within the corolla tube. Style 13–16 mm long, as long as the corolla tube; stigmatic lobes 3–4, 5–6 mm long. Ovary with 3–4 parietal placentas. Fruit elongate-ellipsoid, 25–35 mm long, 11–15 mm diameter, smooth, hexagonal in transverse section; calyx rarely persistent; epicarp pale green whilst developing, yellow green when mature; mesocarp 2 mm thick, fawn; endocarp brittle, 1 mm thick; mature placenta pasty, cream coloured. Seeds 2.2–2.8 mm diameter, 1.2 mm thick; hilum occupying one-third to one-half of the perimeter; tegmen fawn. **Fig. 3A–H.**

Selected specimens: Queensland, COOK DISTRICT: Palmerville rd, 27.2 km W of Cape York rd turnoff, 15°35'S, 144°03'E, Jul 1984, Puttock UNSW17102 & King (BR, BRI, MEL, UNSW); 3.3 km S of Fairview to Kimba rd from the eastern bank of the Kennedy R., 15°39'S, 143°56'E, Jun 1980, Clarkson 3210 (BRI, K, NSW, QRS); Split Rock, 13 km S of Laura, 15°39'S, 144°30'E, Dec 1983, UNSW15926 (holo: BRI; iso: K, NSW); ditto UNSW15927 (UNSW); near Split Rock 13.6 km SE of Laura, 15°39'S, 144°30'E, Jul 1984, Puttock UNSW16991 & King (UNSW); "Jowalbinna", c. 20 miles [32 km] SW of Laura, Feb 1978, Hinton 93 (BRI). (13 specimens examined).

Distribution: *Gardenia rupicola* is endemic to central Cape York Peninsula, in the sandstone area to the west of Laura (15°35'–40'S, 143°55'–144°30'E). **Map 1A.**

Habitat: *Gardenia rupicola* is locally common in open woodland and savannah amongst boulders on scree slopes of the sandstone outcrops and in rock crevices. The average rainfall of the area is 1000–1300 mm per annum.

Phenology: This species flowers between December and April, and is not strongly perfumed. The fruits mature between April and August.

Affinities: *Gardenia rupicola* is closely related to the more northern species, *G. psidioides*, but differs in having smaller, densely tomentose leaves with fewer secondary veins and tertiary venation strongly raised on the abaxial surface, and smaller anthers and fruit, as well as in its habitat.

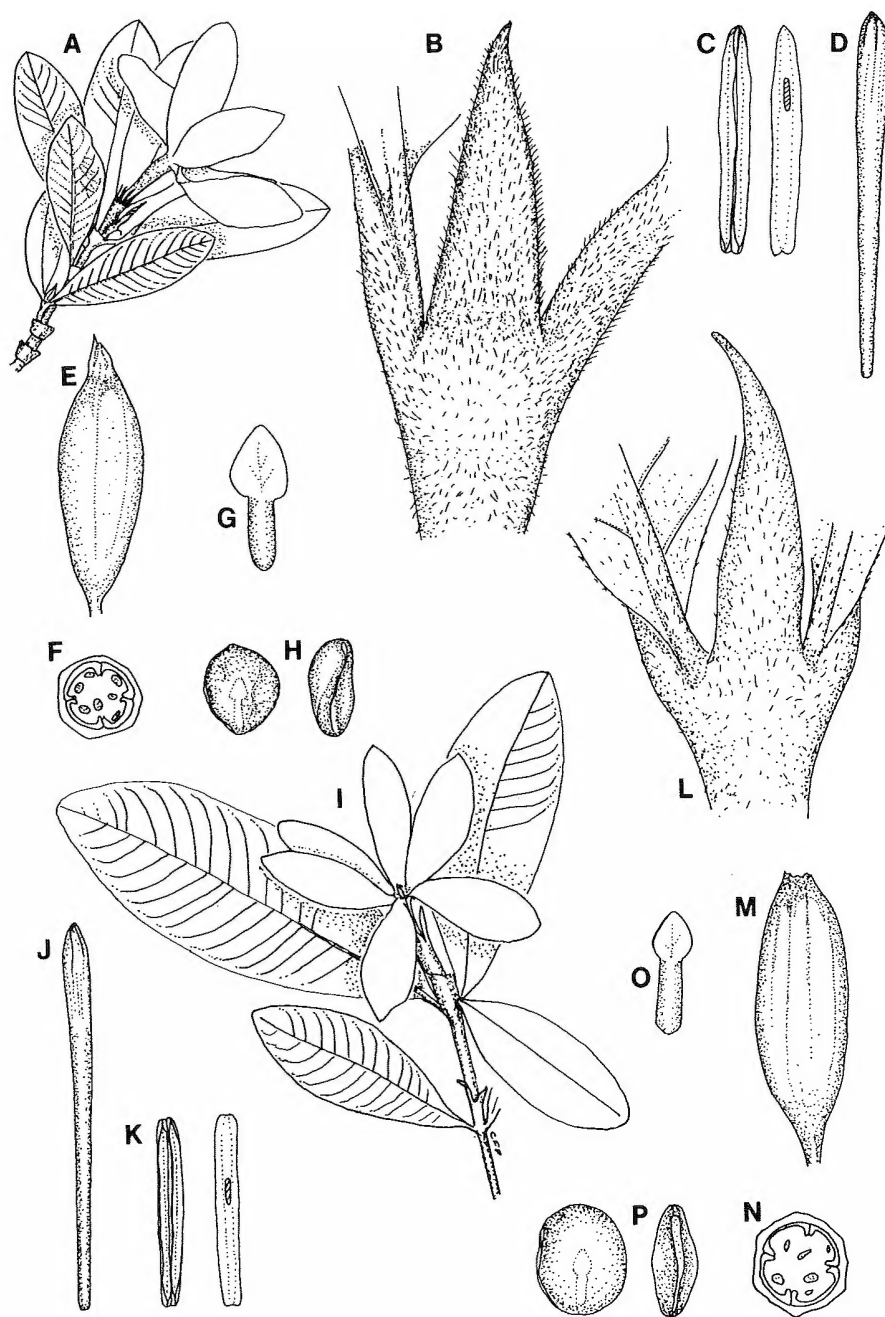


Fig. 3. *Gardenia rupicola*: A. flowering branchlet $\times 0.67$. B. stipule crowning branch tip $\times 5$. C. anther, 2 views $\times 3$. D. style $\times 3$. E. mature fruit $\times 1$. F. T.S. of mature fruit $\times 1$. G. embryo $\times 10$. H. seed, 2 views $\times 3$. *G. scabrella*: I. flowering branchlet $\times 0.67$. J. style $\times 3$. K. anther, 2 views $\times 3$. L. stipule crowning branch tip $\times 5$. M. mature fruit $\times 1$. N. T.S. of mature fruit $\times 1$. O. embryo $\times 10$. P. seed, 2 views $\times 3$. A Puttock UNSW 15927; B–D Puttock UNSW 16991; E–H Puttock UNSW 17102 & King; I Puttock UNSW 16972 & King; J, K Puttock UNSW 16794; M–P Puttock UNSW 15891.

Conservation status: The species is poorly known and has a restricted distribution (Conservation status 3K).

Vernacular name: not known.

Etymology: The specific epithet is derived from *rupes* (rock) and *cola* (dweller).

Gardenia scabrella Puttock, *sp. nov.* *G. actinocarpae* affinis sed fructu hexagono angustioreque, foliis plerumque ternatis, marginibus laminarum non repandis, nervis lateralibus plus numerosis, lobis calycis non compressis differt et a *G. ovulare* foliis scabris, tubo corollae cylindrico, stigmatibus chlorotico, antheris inclusis, fructu anguste ellipsoideo facile distinguenda. **Typus:** COOK DISTRICT: c. 5 km S of Portland Roads, 28 February 1980, *Clarkson* 2939 (holo: BRI; iso: K, NSW, PERTH, QRS, UNSW).

Small evergreen tree to 6 m tall; trunk at breast height to 17 cm diameter. Bark to 10 mm thick; periderm smooth silver grey with pale brown mottling; older stems without conchoidal decortifications; lenticels scattered round or tangentially elongated protrusions; subrhynchidome vivid light green; outer bark not layered, blaze cream; inner bark blaze cream. Wood hard and close grained, not brittle, cream. Leaves ternate or occasionally opposite; chartaceous, glossy mid to yellowish green above, dull pale green below, scabrous; petioles 2–7 mm long; lamina oblanceolate to narrowly obovate, 5.4–15 cm long, 2–4.5 cm wide, with acute apex and base; secondary veins 16–22 pairs, (60–)70–80° to the midvein, raised slightly above and strongly below; tertiary venation strongly percurrent, opaque; tufts of short hyaline hairs in secondary/midvein angles. Stipules conical, 8–12 mm long, inflated, scabrous; colleters lanceolate, 0.6–0.9 mm long, 0.1 mm wide, dense, pale yellow. Flowers 6-merous, solitary, terminal; pedicels 5–10 mm long, scabrous. Torus 5–10 mm long, pale green, minutely ridged. Calyx cylindrical, chartaceous; tube 4–6 mm long; lobes linear, 6–12 mm long. Corolla pale green in bud, white at anthesis, turning brown with age; tube cylindrical, 12–20 mm long, 2 mm diameter at the base increasing to 3–4 mm diameter in the upper part, sparsely scabrous outside, glabrous inside; lobes elliptical, 28–40 mm long, 9–15 mm wide, glabrous. Anthers 8–11 mm long, attached 2–3 mm from their apices, inserted 5–7 mm below the sinuses of the corolla lobes, fully included within the tube. Style 13–21 mm long, scarcely longer than the corolla tube; stigmatic lobes 3–4, 6–7 mm long. Ovary with 3–4 parietal placentas. Fruit elongate-ellipsoid, 30–50 mm long, 12–18 mm diameter, smooth, hexagonal in transverse section; calyx remnants brittle and not always persistent; epicarp pale green whilst developing, yellow green when mature; mesocarp 2–3 mm thick, parenchymatous, cream; endocarp brittle, 1 mm thick; mature placenta pasty, cream coloured. Seeds 1.8–2.8 mm diameter, 1.2–1.6 mm thick; hilum occupying one-third to one-half of the perimeter; tegmen light tan. **Fig. 3I–P.**

Selected specimens: Queensland, COOK DISTRICT: upper reaches of an unnamed ck between Glennie and Hunter Inlets, 12°24'S, 143°07'E, Jun 1978, *Clarkson* 2185 (BRI); Possum Scrub, Weipa, 12°27'S, 142°00'E, Oct 1980, *Hyland* 10746 (QRS); track to Hann Ck, 30.2 km E of Moreton Telegraph Station, 12°27'S, 142°54'E, Jul 1984, *Puttock* UNSW16963 & *King* (UNSW); 14.7 km S of Wenlock R. crossing Cape York rd, 12°34'S, 142°40'E, Jul 1984, *Puttock* UNSW16965 & *King* (BRI, CANB, K, UNSW); NP Res. 8, Weymouth, 12°37'S, 143°21'E, Jan 1982, *Gray* 2408 (QRS, UNSW); c. 5 km S of Portland Roads, Feb 1980, *Clarkson* 2939, (holo: BRI; iso: NSW, PERTH, QRS, UNSW); 5 km SSW of Portland Roads near Chilly Ck, 12°38'S, 143°22'E, Dec 1983, *Puttock* UNSW15891 (BR, K, UNSW); 6.1 km SW of Portland Roads towards Lockhart River, 12°38'S, 143°22'E, Jul 1984, *Puttock* UNSW16794 & *King* (UNSW); Embley Ra., 13 km SW of 'Batavia Downs', 12°42'S, 142°35'E, Jul 1984, *Puttock* UNSW16968 & *King* (BRI, QRS, UNSW); Iron Ra. rd at middle Claudie R. crossing, 12°44'S, 143°17'E, Sep 1976, *Wrigley* 404 (CBG); Claudie R., Nov 1913–Jan 1914, *Kershaw* s.n. (MEL); Iron Ra., Jun 1948, *Brass* 19321 (BRI, CANB); 9.4 km S of 'Batavia Downs', Cape York rd, 12°44'S, 142°42'E, Jul 1984, *Puttock* UNSW16908 & *King* (BR, BRI, CANB, MEL, QRS, UNSW); Weipa rd, 8.3 km W of Cape York rd, 13°14'S, 142°41'E, Jul 1984, *Puttock* UNSW16970 & *King* (BRI, NSW, UNSW); ditto, UNSW16972 (CANB, UNSW). (30 specimens examined).

Distribution: An endemic of northern Cape York Peninsula, from Temple Bay (latitude 12°24'S) on the east coast and Weipa on the west coast south to the junction of the Weipa and Cape York roads (latitude 13°14'S) between 20 and 150 m altitude. **Map 1A.**

Habitat: It is locally common in the Iron Range–Claudie River area where it grows in pockets of semideciduous mesophyll vine forest on quaternary alluvium derived from acidic and basic rocks; elsewhere it grows along water courses and in isolated pockets of deciduous vine thicket on sandy alluvial soils. These areas have an average annual rainfall of 1300–1600 mm.

Phenology: The species has been collected in flower in most months of the year, but particularly from February to June. The flower is not strongly perfumed. The fruits mature between June and September.

Affinities: *G. scabrella* has affinities with *G. actinocarpa* but differs in its hexagonal, more or less flat-sided, elongated fruits, ternate leaves without repand margins, greater number of secondary veins, and linear calyx lobes.

Conservation status: Some coastal populations occur within proposed reserves. The future of the inland populations will depend on the survival of the isolated vine thickets (Conservation status 3K).

Vernacular name: not known.

Etymology: The specific epithet refers to the minute persistent scabrous hairs on the leaves and stems.

When Bailey (1914) named a new species of *Gardenia* after its collector, J.S. Kershaw, he apparently did not realize that Kershaw's collection included two different species from the Claudie River area. The specimen which Bailey kept at BRI and illustrated in the protologue is referable to *G. macgillivraei*; the other, which was sent as a duplicate to Prescott at MEL early in 1914, is identical to *G. scabrella*. The latter specimen was accompanied by a rough outline sketch and manuscript of the *G. kershawii* description, as well as the annotations of the collector, date and locality. This specimen Bailey presumably had intended to be an isotype for MEL. As the BRI specimen must be regarded as the holotype of *G. kershawii*, the taxon represented by the MEL specimen requires a new name.

***Gardenia tessellaris* Puttock, sp. nov.** *G. ovulare* et *G. vilhelmii* proxima sed ab illis cortice valde tessellato, lamina basi decurrenti et nervis lateralibus plus numerosis differt. **Typus:** COOK DISTRICT: 12.4 km S of Laura R. crossing on Cape York rd, 15°38'S, 144°30'E, 9 Dec 1983, Puttock UNSW15849 (holo: BRI; iso: K,NSW).

G. megasperma auct. non F. Muell.; F.M. Bailey, Queensland Dept Agric. Bull. No. 6 Bot. Bull. No. 1: 5 (1890).

Facultatively deciduous, columnar tree to 13 m tall, with an open globose crown; trunk diameter at breast height to 20 cm. Bark on trunk to 30 mm thick, tessellated, dark brown; subrhynchidome orange; outer bark multilayered with blaze alternating pale yellow and pale orange; inner bark blaze white. Bark on branchlet smooth, glaucous; lenticels small irregular to round protrusions; subrhynchidome vivid light green. Wood hard and close grained, brittle, cream. Leaves opposite or ternate, chartaceous, glabrous, glossy mid to yellowish green above, dull pale green below; petioles 7–25 mm long; lamina narrowly obovate, 5.5–12.5 cm long, 2.5–7 cm wide with obtuse apex and decurrent base; secondary veins 13–17 pairs, (40–)50–60° to the midvein, scarcely raised above or below; tertiary venation strongly percurrent, translucent; shallow depressions in secondary/midvein angles covered with a dense tuft of hyaline hairs. Stipules conical, 4–8 mm long, inflated, glabrous; colleters lanceolate, 0.4–0.7 mm long, 0.1 mm wide, brown. Flowers 6–8-merous, solitary, terminal; pedicels 6–11 mm long, glabrous. Torus 9–14 mm long, pale green, not ridged. Calyx coriaceous; tube cylindrical, 2–5 mm long; lobes linear, 12–22 mm long, spreading. Corolla pale green in bud, white at anthesis, turning yellow with age; tube tubiform, 15–30 mm long, 2 mm diameter at the base increasing to 4–6 mm diameter in the upper part, glabrous inside and out; lobes ovate-elliptical, 25–40 mm long, 10–15 mm broad, glabrous. Anthers 7–10 mm long, attached 3–5 mm from their apices, 2–3 mm below the sinuses of the corolla lobes, partially included with tips exceeding the corolla tube by 1–2 mm. Style 16–33 mm long; stigmatic lobes 3–4, 12–14 mm long. Ovary with 3–4 parietal placentas. Fruit globular, 35–55 mm long, 25–42 mm diameter, smooth, sometimes crowned by calyx remnants; epicarp pale green whilst developing, yellow green when mature; mesocarp 4–5 mm thick, granular with an inner sclereid layer, cream coloured; endocarp brittle, 0.5 mm thick; mature placenta pasty, pink. Seeds 2.0–3.0 mm diameter, 1.0–1.2 mm thick; hilum occupying one-third of the perimeter; tegmen pale claret coloured. **Fig. 4A–I.**

Selected specimens: Queensland. COOK DISTRICT: Archer R., Wenlock–Coen rd, Jul 1948, Brass 19728 (BRI,CANB); 39 miles [62.4 km] N of Coen, Jun 1972, Wrigley 1721 & Telford (CGB); 35 km N of Coen on Cape York rd, 13°31'S, 142°59'E, Dec 1983, Puttock UNSW15873 (BR,BRI,CANB,K,MEL,NSW, UNSW); 2.2 km S of Stewarts

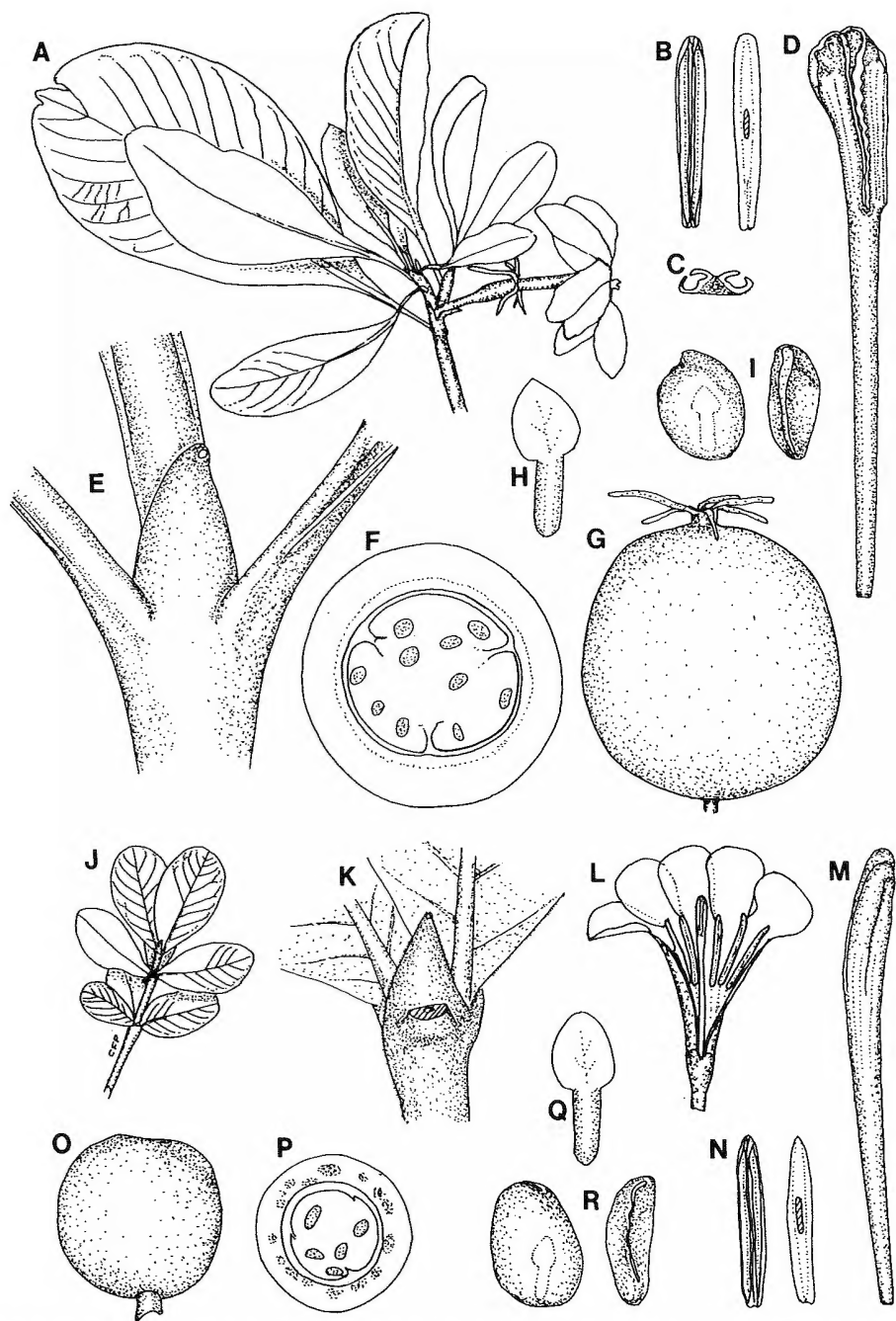


Fig. 4. *Gardenia tessellaris*: A. flowering branchlet $\times 0.67$. B. anther, 2 views $\times 3$. C. T.S. of anther $\times 6$. D. style $\times 3$. E. stipule crowning branch tip $\times 5$. F. T.S. of mature fruit $\times 1$. G. mature fruit $\times 1$. H. embryo $\times 10$. I. seed, 2 views $\times 3$. *G. vilhelmii*: J. branchlet $\times 0.67$. K. stipule crowning branch tip $\times 5$. L. partially dissected flower $\times 2$. M. style $\times 3$. N. anther, 2 views $\times 3$. O. mature fruit $\times 2$. P. T.S. of mature fruit $\times 2$. Q. embryo $\times 10$. R. seed, 2 views $\times 3$. A Puttock UNSW 15849; B-D Puttock UNSW 15873; E Puttock UNSW 15920; F-I Puttock UNSW 15918; J,K Puttock UNSW 17957; L-N Puttock UNSW 15836; N-Q Puttock UNSW 13445 & Wilson.

R. crossing Cape York rd, 14°07'S, 143°16'E, Dec 1983, *Puttock* UNSW15918 (AD,BRI,L,PERTH,UNSW); 6.7 km S of Stewarts R. crossing Cape York rd, 14°10'S, 143°16'E, Dec 1983, *Puttock* UNSW15920 (BRI,QRS,UNSW); c. 11 miles [17.6 km] S by E of Coen, Oct 1962, *Smith* 12000 (BRI); 19.8 km from 'Oroners', on track to New Dixie, 15°21'S, 143°09'E, Jun 1981, *Clarkson* 3761 (NT,PERTH,QRS); Laura sandstone area, N of Laura R. near Early Man site, 15°3-S, 144°3-E, May 1975, *Byrnes* 3351 (QRS); 7 km from Fairview to Kimba rd, 15°38'S, 143°54'E, Apr 1980, *Clarkson* 3222 (BRI,K,QRS); 12.4 km S of Laura R. crossing on Cape York rd, 15°38'S, 144°30'E, Dec 1983, *Puttock* UNSW15849 (holo: BRI; iso: K,NSW); 9.1 km N of St Georges R. crossing on Palmerville rd, 15°39'S, 144°01'E, Jul 1984, *Puttock* UNSW16993 & *King* (BR,BRI,UNSW); 9 miles [14.4 km] S of Laura, 15°41'S, 144°34'E, Oct 1969, *Webb* 9920 & *Tracey* (BRI); Palmer R., without date, *Wycliffe* 79 (MEL); 13 miles [20.8 km] from Telegraph Line, Jul 1968, *Gittins* s.n. (NSW); McLeod R., Oct 1967, *Nicolson* 4040 (BRI); Endeavour R., 1882, *Persich* s.n. (MEL). (24 specimens examined).

Distribution: An endemic of central Cape York Peninsula, from the Archer River (latitude 13°25'S), 40 km north of Coen, to the McLeod River (latitude 16°25'S), west of Mount Carbine, at altitudes of 100 to 200 metres above sea level. **Map 1B.**

Habitat: This species occurs sporadically in open woodlands on the sandy slopes of the Great Dividing Range south and west of Laura and Coen where the average rainfall is 1000–1300 mm per annum.

Phenology: The species flowers from October to December. The flowers have a strong, sweet perfume. The fruits mature between April and October and, when ripe, taste like dried apricots.

Affinities: *G. tessellaris* has distant affinities with *G. ovularis* and *G. vilhelmii*, from which it differs in its dark brown, strongly tessellated bark, obovate leaves with laminae decurrent to the petiole, and larger number of secondary veins. Although *G. ovularis* may possess minutely tessellated or scaly bark, this is only developed on mature trees; the younger trees have smooth bark. The fruit structure with a sclereid layer in the mesocarp, readily separates *G. tessellaris* from *G. ovularis* and the leaves, flowers and fruits are considerably larger than those of *G. vilhelmii*.

Conservation status: This species has a reasonably wide distribution and although it is not currently found in any parks or reserves it does not appear to be threatened.

Vernacular name: not known.

Etymology: The specific epithet refers to the tessellated nature of the bark which is unique among Australian species.

In 1890, Bailey identified a collection as *G. megasperma*: "Hab. Cape York Peninsula, T. Barklay-Millar". The single specimen of *G. tessellaris* annotated by Bailey as *G. megasperma* at BRI is likely to be the one he cited. *Gardenia megasperma* is an endemic species of the Northern Territory and the eastern Kimberley region of Western Australia.

Gardenia vilhelmii Domin, *Biblioth. Bot.* 22(89): 621 (1929). **Typus:** COOK DISTRICT: Savannah woods between Chillagoe and the Walsh River, February 1910, *Domin* s.n. (holo: PR 531160!).

G. edulis F. Muell., *Fragm.* 1: 54 (1858); *non* Poirlet in Lamarck, *Encycl. Suppl.* 2: 708 (1812); *nec* Montrouzier, *Mem. Acad. Roy. Sci. Lyon, Sect. Sci.* 10: 216 (1860); G. Bentham, *Fl. austral.* 3: 408 (1867); F. Mueller, *Fragm.* 7: 48 (1869); F.M. Bailey, *Syn. Queensl. fl.* 222 (1883), *Cat. pl. Queensland* 22 (1890), *Queensl. fl.* 3: 755 (1900), *Compr. cat. Queensland pl.* 241 (1913). **Typus:** COOK DISTRICT: Gilbert River, [Sept–Oct 1856], *Mueller* s.n., (lecto (here designated): K! – flower-bearing twig on right hand side of sheet; iso: MEL 598388!, 598389!).

Small deciduous, single or multistemmed tree to 7 m tall with a turbinate, truncate or tiered crown; trunk at breast height 4–20 cm diameter; lower branches almost vertical, with lateral short branchlets borne in the horizontal plane. Bark to 40 mm thick; periderm smooth, with powdery chartaceous flakes, grey and mustard yellow to ochre; older stems with conchoidal depressions caused by concave decortifications sometimes in excess of 10 cm across; lenticels irregular to tangentially elongated protrusions; subrhynchidome light green; outer bark layered, the blaze reddish brown; inner bark blaze fawn to cream. Wood very brittle, cream. Leaves ternate, 4-nate, or occasionally opposite, chartaceous, rigid when dry, glossy vivid green to yellowish green above, greyish green below, minutely hairy; petioles 1–3 cm long; lamina oblanceolate to obovate, 1–3.5 cm long, 0.6–2 cm

wide, with an obtuse apex and cuneate base; secondary veins 5–11 pairs, 30–40° to the midvein, raised above and not below; tertiary venation weakly percurrent, opaque; conspicuous depressions in secondary midvein angles with tufts of hyaline hairs. Stipules conical, 2–9 mm long, inflated, minutely hairy; colleters lanceolate, 0.2–0.3 mm long, 0.1 mm wide. Flowers 5–6-merous, solitary, terminal, sessile or on pedicels to 2 mm long, minutely hairy, hermaphrodite or male by abortion of the ovary, both types on the one plant. Torus 2 mm long, pale green, minutely longitudinally ridged on the upper part, minutely hairy. Calyx cylindrical, chartaceous, 1–3 mm long, minutely hairy; lobes several–6, 1 mm long, irregular. Corolla crateriform, pale green in bud, white at anthesis, turning yellow with age; tube 6–17 mm long, 2 mm diameter at the base, increasing to 6–8 mm diameter in the upper part, sparsely pubescent outside, glabrous inside; lobes ovate, 5–9 mm long, 6–7 mm broad, glabrous. Anthers 4–8 mm long, attached 2–4 mm from their apices, inserted 3–5 mm below the sinuses of the corolla lobes, partially included, the tips scarcely exceeding the corolla tube. Style 8–20 mm long, exceeding the corolla tube by several millimetres; stigmatic lobes 3–4, 4–8 mm long. Ovary with 3–4 parietal placentas. Fruit spherical, 9–16 mm long, 9–14 mm diameter, smooth, occasionally with 5–6 longitudinal ridges in the upper hemisphere; pedicels 1–2 mm long; calyx not persistent; epicarp pale green whilst developing, yellow when mature; mesocarp stony, 2–3 mm thick; endocarp brittle, 0.5 mm thick; placental mass pasty, pink. Seeds 2.0–3.2 mm diameter, 1.1–1.3 mm thick; hilum occupying one-third to one-half of the perimeter; tegmen claret coloured. **Fig. 4J–R.**

Selected specimens: Queensland. COOK DISTRICT: 13.6 km S of 'Dunbar', 16°08'S, 142°17'E, Jul 1984, *Puttock* UNSW17112 & *King* (UNSW); 9.2 km N of Little Mitchell R. crossing Palmerville rd, 16°13'S, 144°02'E, Jul 1984, *Puttock* UNSW17115 & *King* (UNSW); 6 km S of Kelly St George R. crossing Cape York rd, 16°28'S, 144°49'E, Dec 1983, *Puttock* UNSW15848 (AD,BRI,MEL,NSW,PERTH,UNSW); 2.4 km E of Bull Ck crossing Burke Dev. rd, 16°30'S, 143°20'S, Jul 1984, *Puttock* UNSW17117 & *King* (UNSW); Bellevue Holding, 16°33'S, 144°12'E, Jan 1980, *Hyland* 10200 (QRS); 17.7 km W of Wyaaba Ck crossing Burke Dev. rd, 16°55'S, 141°56'E, Jul 1984, *Puttock* UNSW17118 & *King* (UNSW); Hodgkinson R. (Mt Mulligan), 16°55'S, 144°55'E, Mar 1975, *Hyland* 8140 (QRS,BRI,CANB); Gilbert R., [Sep–Oct 1856], *Mueller* (*G. edulis* lecto: K; syn: MEL); Gilbert R., Forsyth, Feb 1922, *White* 1404 (BRI,K); between Chillagoe & Walsh River, Feb 1910, *Domin* s.n. (holo: PR 531160); 48 mile [76.8 km] W of Dimbulah, Jun 1955, *Tracey* 5374 & *White* (BRI); between the Flinders and the Lynd Rivers, [May–Jun 1845], *Leichhardt* (*G. edulis* syn: K, MEL 598338); Bullock Ck, Etheridge Railway, Feb 1922, *White* 1403 (BRI,NSW); E slope of Mt Surprise, Dec 1983, *Puttock* UNSW15836 (BRI,CANB,DNA,K,MEL,UNSW); Junction Ck, 18°10'S, 144°14'E, Apr 1982, *Puttock* UNSW13443 (UNSW); Newcastle Ra., 120 miles [192 km] SW of Atherton, May 1967, *Dansie* 3713 (L). NORTH KENNEDY DISTRICT: 'Jervoise' Holding, 18°54'S, 144°43'E, May 1974, *Hyland* 9943 (QRS); Eight Mile Ck, 30.5 km N of The Lynd, 18°41'S, 144°43'E, Apr 1982, *Puttock* UNSW13445 & *Wilson* (BRI,CANB,DNA,UNSW). BURKE DISTRICT: between Normanton and Maggieville, Nov 1979, *Clarkson* 2696A (BRI,K,NT,PERTH,QRS); Normanton, 17° 40'S, 141°04'E, Jan 1987, *Puttock* UNSW17957 (UNSW); 18.1 km S of Normanton on Cloncurry Rd, 17°46'S, 140°55'E, Sep 1982, *Puttock* UNSW14488 (BR,K,P,UNSW); 5 miles [8 km] NW of Croydon, Jul 1954, *Speck* 4757 (BRI,CANB,MEL,NSW); 51 miles [81.6 km] W of Croydon, 18°14'S, 41°27'E, Nov 1969, *Barret* s.n. (BRI); SW of junction of Esmeralda Ck with Yappa R., Jul 1954, *Blake* 19662 (BRI). (55 specimens examined).

Distribution: Endemic species to the eastern Gulf country between the Flinders River (140°50'E) and the Great Dividing Range (145°00'E), and Mount Mulgrave (16°15'S) and 'Jervoise' (19°00'S) near The Lynd, at altitudes of 20 to 150 metres. **Map 1A.**

Habitat: A common tree in *Melaleuca* woodlands to the west of Georgetown on red, yellow and brown earths. It is less frequent in the ironbark, bloodwood/stringybark and lancewood woodlands on rocky skeletal soils in the east. It is absent from the cracking clays of the floodplains of the region.

Phenology: Flowering begins immediately after the first rains of the wet season, (October) November to January. The flowers are mildly and pleasantly perfumed. Fruits mature from March until September, and when ripe fall to the ground. *Leichhardt* stated that these fruits tasted like German rye bread.

Affinities: *Gardenia vilhelmii* is distantly related to *G. tessellaris* but differs in its small oblanceolate to obovate leaves, flowers with a very short calyx and a crateriform corolla, and small, spherical fruits.

Vernacular names: 'Bread tree of the Lynd', (*Leichhardt* 1847); 'Candletree', *White* (herb). It has been called the 'Breadfruit-tree' (*Mueller* 1858) and 'the Breadfruit tree of *Leichhardt*' (*Bentham* 1867, *Bailey* 1900) but the latter name is widely applied to *Nauclea orientalis* (L.), a common tree of water courses in North Australia.

Etymology: *Domin* named this species in honour of Prof. Dr Jan Vilhelm, a cryptogamic botanist from Brno, Czechoslovakia.

Typification: The type specimen of *G. vilhelmii* received on loan from Prague (PR), was fragmented and hardly resembled the photograph in Domin (1929) although matching in size and branching pattern; its deterioration was undoubtedly due to the brittleness of the wood and leaves.

Mueller described *Gardenia edulis* in 1858, however, his binomial is a later homonym of *G. edulis* (A. Rich.) Poiret, a South American species. There is also a later homonym, a New Caledonian species, which is not conspecific with the Australian taxon. Domin (1929) was apparently unaware of Mueller's species and described *G. vilhelmii* as a new species.

As the type material of *Gardenia edulis* F. Muell. is a mixed collection, including an undescribed species, it requires lectotypification. The material at K and MEL is the product of at least three gatherings, two of *G. vilhelmii* and one of an undescribed species (*G. sp. aff. G. fucata*) from western Queensland/Northern Territory. The first of these gatherings was made by Leichhardt probably during the time his party was camped on the banks of the Lynd River (Leichhardt 1847: 273). The second specimen was collected by Mueller in late September or early October 1856, on Gregory's North Australian Expedition; this collection is almost certainly represented by the flower-bearing twigs on the specimen at K and the loose flowers in the collection at MEL, since Mueller collected during the flowering season. It is likely that Leichhardt's collection is represented by the leafy twig to the left on the K sheet, and Mueller's by the young-leaved, flower-bearing twigs on the right and above. The remaining fruits and the twig with elliptical leaves belong to the unnamed taxon that Mueller collected on the North Australian Expedition in the vicinity of the present Queensland/Northern Territory border.

The protologue of *G. edulis* (Mueller 1858) appears to be based on both taxa, using the flowers of *G. vilhelmii* and the fruits of *Gardenia sp. aff. fucata*; the fruits of *G. vilhelmii* referred to by Leichhardt (1847: 273) have not been located. Analysis of the description reveals a strong bias in content to *G. vilhelmii*. The flowers of *G. vilhelmii* are very distinctive, being readily separable from all other Australian *Gardenia* species; the description of the fruit, however, could apply to either species or to other north-western Australian species. The flower-bearing Y-forked twig on the right of the sheet at K is chosen as lectotype.

Specimens of several undescribed species of *Gardenia* from the Northern Territory and Western Australia, as well as *G. fucata* R. Br. ex Benth. and *G. pyriformis* R. Br. ex Benth., have been incorrectly determined as *G. edulis* and thus this name appears on most checklists from these states.

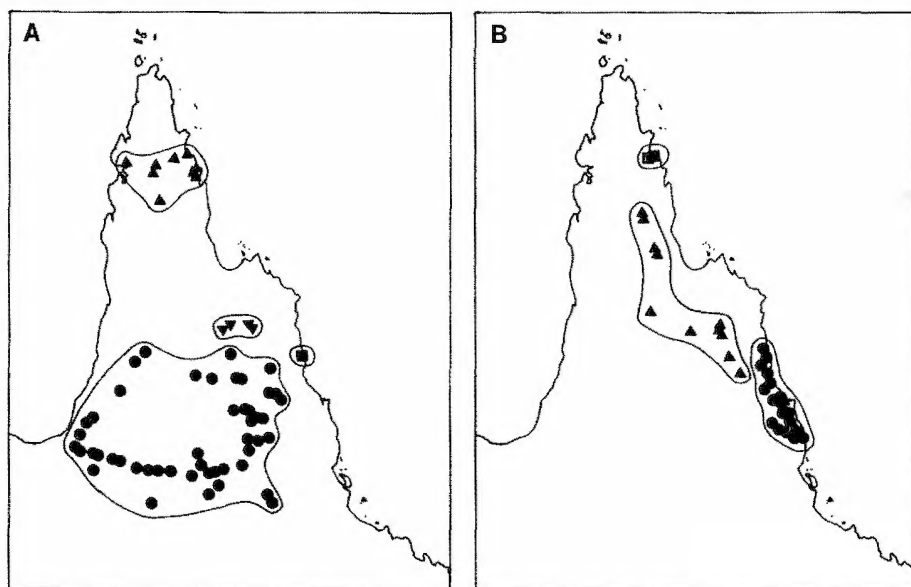
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Map 1. Distribution of north-eastern Queensland *Gardenia* species.
 A. ■ *G. actinocarpa*, ▲ *G. scabrella*, ● *G. wilhelmii*, ▼ *G. rupicola*.
 B. ■ *G. psidioides*, ▲ *G. tessellaris*, ● *G. ovularis*.